What is claimed is:

1. A microfluidic system having enhanced optical detection, comprising:

a microfluidic device that comprises:

a body structure that is planar in a first plane;

a first channel segment that is parallel to the first plane;

a detection channel segment having a first and a second end, wherein the first end of the detection channel segment is in fluid communication with the first channel segment, the detection channel segment being oriented substantially orthogonally to the first plane; and

a detection system in sensory communication with the detection channel segment and oriented to provide a detection path substantially along a longitudinal axis of the detection channel segment.

2. The microfluidic system of claim 1, wherein the body structure comprises at least first and second substrate layers bonded together, the first channel segment being defined at an interface of the first and second planar substrates, and wherein the detection channel segment comprises a via disposed through at least one of the first and second planar substrates.

3. The microfluidic system of claim 1, further comprising a second channel segment that is in fluid communication with the second end of the detection channel segment.

4. The microfluidic system of claim 1, wherein the body structure comprises at least first, second and third planar substrate layers, a first surface of the first substrate being bonded to a first surface of the second substrate, and a first surface of the third substrate being bonded to a second surface of the second substrate, the second surface of the second substrate being opposite to the first surface of the second substrate, the first channel segment being defined at an interface of the first and second planar substrate layers, and the second channel segment being defined at an interface of the second and third planar substrate layers, and wherein the detection channel segment comprises a via disposed through at least the second planar substrate layer.

5. The microfluidic system of claim 1, wherein the detection system comprises an absorbance measurement system.

6. The microfluidic system of claim 1, wherein the absorbance detection system comprises:

a light source;

an optical train positioned proximal to the first end of the detection channel segment, wherein the optical train directs light from the light source through the first end of the detection channel segment; and

a light detector positioned proximal to the second end of the detection channel segment for detecting an amount of light that passes through the detection channel segment.

7. The microfluidic system of claim 1, wherein the detection channel segment has a cross sectional area that is between about 0.1 and 5 times a cross sectional area of at least one of the first and second channel segments.

8. The microfluidic system of claim 1, wherein the cross-sectional area of the detection channel segment is from about 0.5 to about 2 times the cross sectional area of at least one of the first and second channel segments.

9. The microfluidic system of claim 1, wherein the detection channel segment is from about 10 μm to about 1mm in length.

10. The microfluidic system of claim 1, wherein the detection channel segment is from about 50 to about 500 μm in length.

11. The microfluidic system of claim 1, wherein the detection channel segment is from about 100 to about 250 μm in length.

12. The microfluidic system of claim 1, wherein the detection channel segment comprises a volume that is less than 100 nl.

13. The microfluidic system of claim 1, wherein the detection channel segment comprises a volume that is less than 10 nl.

14. The microfluidic system of claim 1, wherein the detection channel segment comprises a volume that is less than 1 nl.

15. A microfluidic system for enhanced optical detection, comprising:

a body structure that is planar in a first plane;

a first detection channel segment being disposed in a second plane that is substantially orthogonal to the first plane; and

an optical detector positioned to be in sensory communication with the first detection channel segment, the detector being oriented to direct light into and receive light from the detection channel segment along a detection path that is substantially parallel to the second plane.

16. The microfluidic system of claim 0, wherein the first and second planes are parallel.

17. The microfluidic system of claim 0, further comprising at least a second channel segment in fluid communication with the detection channel segment.

18. The microfluidic system of claim 0, wherein the second channel segment is disposed to be positioned in a third plane that is different from the first plane.

19. The microfluidic system of claim 0, wherein the first and second channel segments are disposed in a planar body structure, the first and second planes being perpendicular to a plane of the planar body structure and the third plane being parallel to the plane of the body structure.

20. The microfluidic system of claim 0, wherein the planar body structure comprises at least first, second and third substrate layers, wherein the first substrate layer is sandwiched between the second and third substrate layers, the first channel segment being disposed as an aperture through the first substrate layer, and the second channel segment being disposed at the interface of the first and second substrate layers.

21. A microfluidic system comprising:

a planar body structure comprising a first channel and a detection channel segment disposed therein, the first channel being disposed in a major plane of the planar body structure, and the detection channel being disposed substantially orthogonally to the major plane of the body structure; and

an optical detector in sensory communication with the detection channel segment, the optical detector being positioned to direct and/or receive optical energy in a direction parallel to the detection channel segment through an end of the detection channel segment.

22. An analytical system, comprising

a first fluid conduit disposed in a body structure, the first fluid conduit having first and second ends, and a longitudinal axis;

a light source proximal to the first end of the first fluid conduit, and positioned to direct light through the first fluid conduit in a path substantially parallel to the longitudinal axis;

at least a first spatial filter attached to the body structure and positioned between the first end of the fluid conduit and the light source; and

an optical detector positioned to receive optical signals from the first fluid conduit.

23. The system of claim 22, wherein the optical detector is positioned proximal to the second end of the first fluid conduit and directed to receive light from the light source that passes through the first fluid conduit.

24. The system of claim 23, further comprising a second spatial filter positioned between the second end of the first fluid conduit and the optical detector.

25. The system of claim 22, wherein the at least first spatial filter is provided on an exterior surface of the body structure.

26. The system of claim 22, wherein the at least first spatial filter is disposed in an interior region of the body structure.

27. An analytical system, comprising

a first fluid conduit disposed in a body structure, the first fluid conduit having first and second ends, and a longitudinal axis;

a light source proximal to the first end of the first fluid conduit, and positioned to direct light through the first fluid conduit in a path substantially parallel to the longitudinal axis;

at least a first spatial filter attached to the body structure and positioned proximal to the first end of the fluid conduit such that light from the light source passes through the spatial filter before entering into the first fluid conduit; and

an optical detector positioned to receive optical signals from the first fluid conduit.

28. The system of claim 27, wherein the optical detector is positioned proximal to the second end of the first fluid conduit and directed to receive light from the light source that passes through the first fluid conduit.

29. The system of claim 28, further comprising a second spatial filter positioned proximal to the second end of the first fluid conduit and the optical detector, such that light from the first fluid conduit that contacts the detector passes through the second spatial filter.

30. The system of claim 27, wherein the at least first spatial filter is provided on an exterior surface of the body structure.

31. The system of claim 27, wherein the at least first spatial filter is disposed in an interior region of the body structure.

32. A method of performing an analytical operation in a microscale channel, comprising:

providing a planar microfluidic device having a first detection channel segment that is substantially orthogonal to a major plane of the planar microfluidic device;

introducing a sample material into the first detection channel segment, the first sample material having a concentration of an optically detectable material disposed therein;

directing an optical detection path through the sample material in the detection channel segment at an angle that is substantially parallel to a longitudinal axis of the first detection channel segment; and

detecting an optical signal from the sample material.

33. The method of claim 32, wherein the steps of directing and detecting comprise directing a light signal through the sample material and detecting an amount of light transmitted by the sample material.

34. The method of claim 32 further comprising the step of determining an amount of the light signal absorbed by the sample material from the amount of light signal transmitted by the sample material.

35. The method of claim 32, further comprising providing at least a second channel disposed in the planar microfluidic device, the second channel being parallel to the major plane of the microfluidic device, and in fluid communication with the first detection channel segment.

36. The method of claim 32, wherein the first channel is also fluidly connected to a sampling capillary that is attached to and extends from the microfluidic device, and wherein the step of introducing the first sample material into the detection channel segment comprises drawing a sample material from a source of sample material into the sampling capillary and transporting the sample material into the second channel segment and into the detection channel segment.

37. A method of enhancing sensitivity of optical detection in a microscale channel, comprising:

introducing a sample fluid having a concentration of optically detectable material disposed therein into a detection channel segment having a first length;

directing light along substantially the entire first length from at least one end of the detection channel segment; and

detecting the optically detectable material from at least one end of the detection channel segment.